CLAIMS

We Claim:

1. A nonlinear crystal used for mixing of optical signals, the nonlinear crystal comprising:

a plurality of domains, the domains being arranged serially across the nonlinear crystal, the domains having alternating polarity; and,

wherein the poling periods of the domains are varied across the nonlinear crystal so as to provide nonuniform chirping of phase matching of focused optical signals propagated through the nonlinear crystal.

2. A nonlinear crystal as in claim 1 wherein the nonlinear crystal is composed of periodically poled lithium niobate (PPLN).

3. A nonlinear crystal as in claim 1 wherein a chirp slope is steeper near a center of the non-linear crystal and shallower towards end facets of the non-linear crystal.

4. A nonlinear crystal as in claim 1, wherein the poling periods of the domains are varied across the nonlinear crystal so as to provide nonlinear chirping of phase matching of the focused optical signals propagated through the nonlinear crystal.

5. A nonlinear crystal as in claim 1, wherein the poling periods of the domains are varied across the nonlinear crystal so as to provide piecewise

linear chirping of phase matching of the focused optical signals propagated through the nonlinear crystal.

6. A nonlinear crystal as in claim 1 wherein the focused optical signals comprise:

a first focused optical signal; and,

a second focused optical signal, the second focused optical signal being an optical strobe signal.

7. A nonlinear crystal as in claim 1 wherein nonlinear crystal is within an optical sampling digital oscilloscope.

8. A method for increasing spectral acceptance within a nonlinear crystal, the method comprising the following steps:

(a) arranging the nonlinear crystal as a plurality of domains, the plurality of domains having alternating polarity as the domains are traversed serially across the nonlinear crystal; and,

(b) varying the poling periods of the domains across the nonlinear crystal so as to provide nonuniform chirping of phase matching of focused optical signals propagated through the nonlinear crystal.

9. A method as in claim 8 wherein in step (a) the nonlinear crystal is composed of periodically poled lithium niobate (PPLN).

10. A method as in claim 8 wherein in step (b) a chirp slope is steeper near a center of the non-linear crystal and shallower towards end facets of the non-linear crystal.

11. A method as in claim 8, wherein in step (b) the poling periods of the domains are varied across the nonlinear crystal so as to provide nonlinear chirping of phase matching of the focused optical signals propagated through the nonlinear crystal.

12. A method as in claim 8, wherein in step (b) the poling periods of the domains are varied across the nonlinear crystal so as to provide piecewise linear chirping of phase matching of the focused optical signals propagated through the nonlinear crystal.

13. A nonlinear crystal with increased spectral acceptance, the nonlinear crystal comprising:

a plurality of domains, the domains being arranged serially across the nonlinear crystal, the domains having alternating polarity; and,

wherein the poling periods of the domains are varied across the nonlinear crystal so as to provide nonuniform chirping of phase matching of focused optical signals propagated through the nonlinear crystal.

14. A nonlinear crystal as in claim 13, wherein the nonlinear crystal is composed of periodically poled lithium niobate (PPLN).

15. A nonlinear crystal as in claim 13 wherein a chirp slope is steeper near a center of the non-linear crystal and shallower towards end facets of the non-linear crystal.

16. A nonlinear crystal as in claim 13, wherein the poling periods of the domains are varied across the nonlinear crystal so as to provide nonlinear chirping of phase matching of the focused optical signals propagated through the nonlinear crystal.

17. A nonlinear crystal as in claim 13, wherein the poling periods of the domains are varied across the nonlinear crystal so as to provide piecewise linear chirping of phase matching of the focused optical signals propagated through the nonlinear crystal.

18. A nonlinear crystal as in claim 13, wherein nonlinear crystal is within an optical sampling digital oscilloscope.